

Noble Energy

Weld County, CO (NAD 83)

Sec. 2-T4N-R65W (Lower Latham 2 PAD)

Lower Latham PC G12-69HN - A2

Design: MWD Survey

Sperry Drilling Services

Final Survey Report

29 September, 2011

Well Coordinates: 1,366,071.34 N, 3,244,782.28 E (40° 20' 05.78" N, 104° 37' 18.95" W)

Ground Level: 4,709.00 ft

Local Coordinate Origin: Centered on Well Lower Latham PC G12-69HN - Slo

Viewing Datum: KB @ 4733.00ft (Rig KB)

TVDs to System: N

North Reference: Grid

Unit System: API - US Survey Feet - Custom

Geodetic Scale Factor Applied

Version: 2003.16 Build: 43I

HALLIBURTON

Design Report for Lower Latham PC G12-69HN - MWD Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
797.00	0.67	288.07	796.98	1.45	-4.43	-4.52	0.08
First MWD Survey							
889.00	0.39	249.73	888.98	1.50	-5.24	-5.32	0.48
976.00	0.41	308.59	975.98	1.60	-5.76	-5.85	0.45
1,072.00	1.20	91.44	1,071.97	1.78	-5.02	-5.13	1.61
1,353.00	1.16	94.07	1,352.91	1.51	0.76	0.66	0.02
1,637.00	0.44	57.50	1,636.88	1.89	4.55	4.41	0.30
1,727.00	1.99	142.95	1,726.86	0.83	5.78	5.71	2.23
1,822.00	4.04	160.63	1,821.73	-3.65	7.88	8.11	2.34
1,917.00	5.28	150.31	1,916.41	-10.60	11.16	11.85	1.57
2,011.00	6.58	136.33	2,009.91	-18.25	17.02	18.21	2.06
2,106.00	7.62	164.43	2,104.21	-28.26	22.47	24.32	3.77
2,200.00	9.22	166.59	2,197.20	-41.59	25.89	28.63	1.73
2,297.00	9.76	169.92	2,292.87	-57.25	29.13	32.91	0.79
2,392.00	9.20	157.70	2,386.58	-72.20	33.42	38.20	2.19
2,487.00	9.74	156.02	2,480.29	-86.57	39.57	45.30	0.64
2,583.00	10.01	156.55	2,574.86	-101.64	46.19	52.91	0.30
2,679.00	12.26	148.51	2,669.06	-117.99	54.84	62.64	2.84
2,775.00	13.12	149.03	2,762.71	-136.03	65.77	74.76	0.90
2,871.00	13.35	148.60	2,856.16	-154.83	77.15	87.38	0.26
2,967.00	9.84	156.00	2,950.19	-171.79	86.26	97.61	3.96
3,062.00	11.20	156.25	3,043.59	-187.65	93.28	105.68	1.43
3,158.00	9.18	155.84	3,138.07	-203.17	100.17	113.59	2.11
3,254.00	7.33	150.10	3,233.08	-215.47	106.36	120.59	2.11
3,350.00	6.88	157.69	3,328.34	-226.10	111.60	126.53	1.08
3,445.00	6.68	156.27	3,422.68	-236.42	115.98	131.60	0.27
3,541.00	7.18	151.34	3,517.98	-246.80	121.10	137.41	0.81
3,637.00	7.49	154.71	3,613.19	-257.72	126.65	143.68	0.55
3,732.00	8.57	159.81	3,707.26	-269.96	131.74	149.58	1.36
3,827.00	9.82	162.27	3,801.04	-284.32	136.65	155.44	1.38
3,924.00	10.11	162.26	3,896.57	-300.31	141.77	161.62	0.30
4,019.00	7.94	160.79	3,990.39	-314.45	146.47	167.26	2.30
4,115.00	5.68	153.46	4,085.71	-324.96	150.77	172.26	2.52
4,211.00	3.29	154.59	4,181.41	-331.70	154.08	176.01	2.49
4,306.00	0.49	236.56	4,276.36	-334.39	154.91	177.02	3.43
4,402.00	0.53	345.83	4,372.35	-334.18	154.46	176.55	0.87
4,690.00	1.60	96.09	4,660.32	-333.32	158.13	180.16	0.64
4,786.00	1.17	355.24	4,756.30	-332.48	159.38	181.35	2.24
4,882.00	1.73	116.68	4,852.28	-332.16	160.59	182.54	2.65
4,978.00	1.28	57.72	4,948.25	-332.24	162.79	184.74	1.60
5,074.00	2.62	36.70	5,044.20	-329.90	165.01	186.80	1.56
5,169.00	1.63	155.32	5,139.16	-329.39	166.87	188.62	3.88
5,264.00	0.91	83.06	5,234.14	-330.53	168.19	190.01	1.69
5,360.00	1.28	50.48	5,330.13	-329.75	169.77	191.54	0.74
5,456.00	0.92	13.77	5,426.11	-328.32	170.78	192.45	0.80
5,551.00	0.91	24.10	5,521.10	-326.89	171.27	192.84	0.17
5,645.00	0.68	328.43	5,615.09	-325.74	171.28	192.78	0.82
5,836.00	0.30	235.34	5,806.08	-325.06	170.28	191.73	0.40
6,049.00	0.57	98.92	6,019.08	-325.54	170.87	192.35	0.38

Design Report for Lower Latham PC G12-69HN - MWD Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)
6,110.00	1.03	81.96	6,080.07	-325.51	171.71	193.19	0.84
6,191.00	4.43	108.60	6,160.97	-326.40	175.40	196.93	4.37
6,223.00	8.27	103.02	6,192.77	-327.32	178.81	200.39	12.14
6,271.00	13.08	102.60	6,239.93	-329.28	187.48	209.18	10.02
6,318.00	16.30	98.26	6,285.39	-331.39	199.20	221.01	7.24
6,366.00	19.79	90.68	6,331.02	-332.45	214.00	235.85	8.75
6,415.00	22.54	91.47	6,376.71	-332.79	231.69	253.52	5.64
6,463.00	25.28	94.14	6,420.59	-333.77	251.11	272.96	6.14
6,511.00	28.40	95.53	6,463.42	-335.61	272.70	294.63	6.63
6,559.00	31.37	93.58	6,505.03	-337.49	296.54	318.54	6.51
6,606.00	36.35	90.10	6,544.05	-338.28	322.69	344.69	11.37
6,654.00	39.83	88.26	6,581.82	-337.84	352.29	374.19	7.63
6,701.00	42.16	87.79	6,617.30	-336.77	383.11	404.86	5.00
6,749.00	46.48	87.77	6,651.63	-335.47	416.61	438.20	9.00
6,797.00	50.79	88.49	6,683.34	-334.30	452.60	474.04	9.05
6,845.00	54.52	90.30	6,712.46	-333.92	490.75	512.07	8.33
6,893.00	58.25	90.65	6,739.02	-334.25	530.72	551.97	7.79
6,941.00	61.28	91.70	6,763.19	-335.11	572.17	593.39	6.59
6,989.00	63.60	92.91	6,785.40	-336.82	614.69	635.92	5.32
7,037.00	69.12	93.77	6,804.64	-339.39	658.57	679.88	11.62
7,085.00	74.66	93.30	6,819.56	-342.20	704.09	725.48	11.58
7,133.00	77.30	94.34	6,831.18	-345.30	750.55	772.05	5.89
7,172.00	81.37	94.04	6,838.40	-348.10	788.76	810.36	10.46
7,242.00	86.46	97.19	6,845.82	-354.92	858.00	879.90	8.54
7,305.00	87.81	94.27	6,848.97	-361.20	920.60	942.78	5.10
7,401.00	88.77	92.54	6,851.83	-366.90	1,016.38	1,038.73	2.06
7,497.00	88.03	90.82	6,854.51	-369.71	1,112.30	1,134.62	1.95
7,592.00	88.03	90.51	6,857.78	-370.81	1,207.24	1,229.42	0.33
7,688.00	88.92	90.48	6,860.33	-371.64	1,303.20	1,325.22	0.93
7,783.00	91.05	91.72	6,860.36	-373.47	1,398.17	1,420.10	2.59
7,879.00	90.06	91.67	6,859.43	-376.31	1,494.13	1,516.03	1.03
7,975.00	90.06	90.01	6,859.33	-377.71	1,590.11	1,611.89	1.73
8,071.00	90.83	90.11	6,858.58	-377.81	1,686.11	1,707.68	0.81
8,166.00	89.72	87.02	6,858.13	-375.43	1,781.07	1,802.26	3.46
8,262.00	90.49	86.63	6,857.95	-370.12	1,876.92	1,897.54	0.90
8,357.00	91.54	88.22	6,856.27	-365.85	1,971.80	1,991.92	2.01
8,453.00	89.78	88.14	6,855.16	-362.80	2,067.74	2,087.44	1.84
8,549.00	92.69	89.22	6,853.09	-360.59	2,163.68	2,183.02	3.23
8,644.00	89.75	88.68	6,851.07	-358.85	2,258.64	2,277.64	3.15
8,740.00	88.34	88.88	6,852.67	-356.81	2,354.60	2,373.25	1.48
8,836.00	88.71	88.22	6,855.14	-354.38	2,450.54	2,468.80	0.79
8,931.00	89.51	87.65	6,856.62	-350.95	2,545.46	2,563.29	1.03
9,027.00	88.68	87.90	6,858.13	-347.23	2,641.38	2,658.73	0.90
9,122.00	89.04	86.88	6,860.02	-342.90	2,736.26	2,753.11	1.14
9,218.00	89.14	87.47	6,861.55	-338.17	2,832.13	2,848.45	0.62
9,314.00	88.80	87.49	6,863.27	-333.95	2,928.02	2,943.84	0.35
9,409.00	89.41	88.94	6,864.76	-330.99	3,022.96	3,038.36	1.66
9,505.00	91.04	90.27	6,864.38	-330.33	3,118.95	3,134.09	2.19
9,601.00	91.11	90.33	6,862.58	-330.83	3,214.93	3,229.89	0.10
9,696.00	91.11	91.58	6,860.74	-332.42	3,309.90	3,324.75	1.32
9,792.00	91.60	91.46	6,858.47	-334.96	3,405.84	3,420.65	0.53

Design Report for Lower Latham PC G12-69HN - MWD Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)
9,888.00	90.12	91.98	6,857.03	-337.84	3,501.78	3,516.57	1.63
9,983.00	90.18	92.35	6,856.78	-341.43	3,596.71	3,611.52	0.39
10,079.00	88.21	92.51	6,858.13	-345.50	3,692.61	3,707.48	2.06
10,174.00	87.81	93.04	6,861.43	-350.10	3,787.44	3,802.41	0.70
10,270.00	88.43	92.29	6,864.58	-354.56	3,883.29	3,898.33	1.01
10,365.00	90.00	92.53	6,865.88	-358.55	3,978.19	3,993.29	1.67
10,460.00	90.25	92.57	6,865.67	-362.78	4,073.10	4,088.27	0.27
10,556.00	90.59	91.75	6,864.97	-366.40	4,169.02	4,184.22	0.92
10,651.00	91.42	91.83	6,863.30	-369.37	4,263.96	4,279.14	0.88
10,747.00	89.01	90.39	6,862.94	-371.23	4,359.93	4,375.02	2.92
10,842.00	88.67	89.84	6,864.86	-371.42	4,454.91	4,469.80	0.68
10,938.00	91.54	90.46	6,864.69	-371.67	4,550.90	4,565.59	3.06
11,033.00	92.06	90.12	6,861.71	-372.15	4,645.85	4,660.36	0.65
11,129.00	91.57	88.89	6,858.66	-371.32	4,741.80	4,756.03	1.38
11,224.00	92.10	89.12	6,855.62	-369.67	4,836.74	4,850.64	0.61
11,319.00	90.80	88.58	6,853.22	-367.76	4,931.69	4,945.25	1.48
11,415.00	90.74	88.64	6,851.93	-365.44	5,027.65	5,040.84	0.09
11,510.00	90.06	89.28	6,851.27	-363.71	5,122.63	5,135.49	0.98
11,606.00	88.37	88.57	6,852.58	-361.91	5,218.60	5,231.12	1.91
11,701.00	87.59	88.86	6,855.93	-359.78	5,313.52	5,325.68	0.88
11,797.00	87.84	88.46	6,859.76	-357.54	5,409.41	5,421.21	0.49
11,893.00	88.86	88.59	6,862.52	-355.07	5,505.34	5,516.76	1.07
11,999.00	89.17	88.77	6,864.34	-352.63	5,611.30	5,622.31	0.34
Final MWD Survey							
12,060.00	89.17	88.77	6,865.23	-351.32	5,672.28	5,683.06	0.00
Survey Projection to TD - Estimated BHL: 42' FNL, 122' FWL							

Design Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
797.00	796.98	1.45	-4.43	First MWD Survey
11,999.00	6,864.34	-352.63	5,611.30	Final MWD Survey
12,060.00	6,865.23	-351.32	5,672.28	Survey Projection to TD
12,060.00	6,865.23	-351.32	5,672.28	Estimated BHL: 42' FNL, 122' FWL

Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin		Start TVD (ft)
				+N/-S (ft)	+E/-W (ft)	
User	Lower Latham PC G12-69HN_PlanA - Rev0_BHL Tgt	93.85	Slot	0.00	0.00	0.00

Survey tool program

From (ft)	To (ft)	Survey/Plan	Survey Tool
797.00	12,060.00	Sperry MWD Surveys	MWD

Design Report for Lower Latham PC G12-69HN - MWD Survey

Targets

Target Name - hit/miss target - Shape	Dip Angle (°)	Dip Dir. (°)	TVD (ft)	+N/-S (ft)	+E/-W (ft)	Northing (ft)	Easting (ft)	Latitude	Longitude
Lower Latham PC	0.00	0.00	0.00	0.25	25.09	1,366,071.59	3,244,807.37	40.334940	-104.621840
- actual wellpath misses target center by 25.09ft at 0.00ft MD (0.00 TVD, 0.00 N, 0.00 E)									
- Polygon									
Point 1			276.09	-248.75	1,365,822.60	3,245,058.36			
Point 2			5,548.09	-312.75	1,365,758.60	3,250,330.14			
Point 3			5,599.09	-5,594.75	1,360,476.83	3,250,381.13			
Point 4			345.09	-5,537.75	1,360,533.82	3,245,127.35			
Point 5			276.09	-248.75	1,365,822.60	3,245,058.36			
Lower Latham PC	0.00	0.00	0.00	0.25	25.09	1,366,071.59	3,244,807.37	40.334940	-104.621840
- actual wellpath misses target center by 25.09ft at 0.00ft MD (0.00 TVD, 0.00 N, 0.00 E)									
- Polygon									
Point 1			6,008.09	-772.75	1,365,298.62	3,250,790.12			
Point 2			10,125.09	-662.75	1,365,408.62	3,254,906.94			
Point 3			10,169.09	-5,013.75	1,361,057.80	3,254,950.94			
Point 4			6,059.09	-5,134.75	1,360,936.81	3,250,841.11			
Point 5			6,008.09	-772.75	1,365,298.62	3,250,790.12			
Lower Latham PC	0.00	0.00	0.00	0.25	25.09	1,366,071.59	3,244,807.37	40.334940	-104.621840
- actual wellpath misses target center by 25.09ft at 0.00ft MD (0.00 TVD, 0.00 N, 0.00 E)									
- Polygon									
Point 1			-183.91	211.25	1,366,282.58	3,244,598.38			
Point 2			-4,543.91	159.25	1,366,230.58	3,240,238.56			
Point 3			-4,602.91	4,419.25	1,370,490.41	3,240,179.56			
Point 4			-204.91	4,464.25	1,370,535.40	3,244,577.38			
Lower Latham PC	0.00	0.00	0.00	0.25	25.09	1,366,071.59	3,244,807.37	40.334940	-104.621840
- actual wellpath misses target center by 25.09ft at 0.00ft MD (0.00 TVD, 0.00 N, 0.00 E)									
- Polygon									
Point 1			-183.91	-708.75	1,365,362.62	3,244,598.38			
Point 2			-114.91	-5,077.75	1,360,993.81	3,244,667.37			
Point 3			-4,406.91	-5,117.75	1,360,953.81	3,240,375.55			
Point 4			-4,543.91	-760.75	1,365,310.62	3,240,238.56			
Point 5			-183.91	-708.75	1,365,362.62	3,244,598.38			
Lower Latham PC	0.00	0.00	0.00	0.25	25.09	1,366,071.59	3,244,807.37	40.334940	-104.621840
- actual wellpath misses target center by 25.09ft at 0.00ft MD (0.00 TVD, 0.00 N, 0.00 E)									
- Polygon									
Point 1			276.09	-248.75	1,365,822.60	3,245,058.36			
Point 2			-5,003.91	-300.75	1,365,770.60	3,239,778.58			
Point 3			-5,062.91	4,879.25	1,370,950.39	3,239,719.58			
Point 4			255.09	4,924.25	1,370,995.38	3,245,037.36			
Point 5			276.09	-248.75	1,365,822.60	3,245,058.36			
Lower Latham PC	0.00	0.00	6,857.00	-383.73	5,699.85	1,365,687.62	3,250,481.89	40.333730	-104.601500
- actual wellpath misses target center by 43.34ft at 12060.00ft MD (6865.23 TVD, -351.32 N, 5672.28 E)									
- Point									
Lower Latham PC	0.00	0.00	0.00	0.25	25.09	1,366,071.59	3,244,807.37	40.334940	-104.621840
- actual wellpath misses target center by 25.09ft at 0.00ft MD (0.00 TVD, 0.00 N, 0.00 E)									
- Polygon									
Point 1			736.09	-708.75	1,365,362.62	3,245,518.34			
Point 2			5,088.09	-772.75	1,365,298.62	3,249,870.15			
Point 3			5,139.09	-5,134.75	1,360,936.81	3,249,921.15			
Point 4			805.09	-5,077.75	1,360,993.81	3,245,587.33			
Point 5			736.09	-708.75	1,365,362.62	3,245,518.34			
Lower Latham PC	0.00	0.00	0.00	0.25	25.09	1,366,071.59	3,244,807.37	40.334940	-104.621840
- actual wellpath misses target center by 25.09ft at 0.00ft MD (0.00 TVD, 0.00 N, 0.00 E)									
- Polygon									
Point 1			276.09	-248.75	1,365,822.60	3,245,058.36			
Point 2			345.09	-5,537.75	1,360,533.82	3,245,127.35			
Point 3			-4,866.91	-5,577.75	1,360,493.83	3,239,915.57			
Point 4			-5,003.91	-300.75	1,365,770.60	3,239,778.58			
Point 5			276.09	-248.75	1,365,822.60	3,245,058.36			
Lower Latham PC	0.00	0.00	0.00	0.25	25.09	1,366,071.59	3,244,807.37	40.334940	-104.621840
- actual wellpath misses target center by 25.09ft at 0.00ft MD (0.00 TVD, 0.00 N, 0.00 E)									

Design Report for Lower Latham PC G12-69HN - MWD Survey

- Polygon				
Point 1	5,548.09	-312.75	1,365,758.60	3,250,330.14
Point 2	10,585.09	-202.75	1,365,868.60	3,255,366.92
Point 3	10,629.09	-5,473.75	1,360,597.82	3,255,410.92
Point 4	5,599.09	-5,594.75	1,360,476.83	3,250,381.13
Point 5	5,548.09	-312.75	1,365,758.60	3,250,330.14

North Reference Sheet for Sec. 2-T4N-R65W (Lower Latham 2 PAD) - Lower Latham PC G12-69HN - Plan A

All data is in US Feet unless otherwise stated. Directions and Coordinates are relative to Grid North Reference.

Vertical Depths are relative to KB @ 4733.00ft (Rig KB). Northing and Easting are relative to Lower Latham PC G12-69HN - Slot A2

Coordinate System is US State Plane 1983, Colorado Northern Zone using datum North American Datum 1983, ellipsoid GRS 1980

Projection method is Lambert Conformal Conic (2 parallel)

Central Meridian is -105.500000°, Longitude Origin:0.000000°, Latitude Origin:40.783333°

False Easting: 3,000,000.00ft, False Northing: 1,000,000.00ft, Scale Reduction: 0.99995792

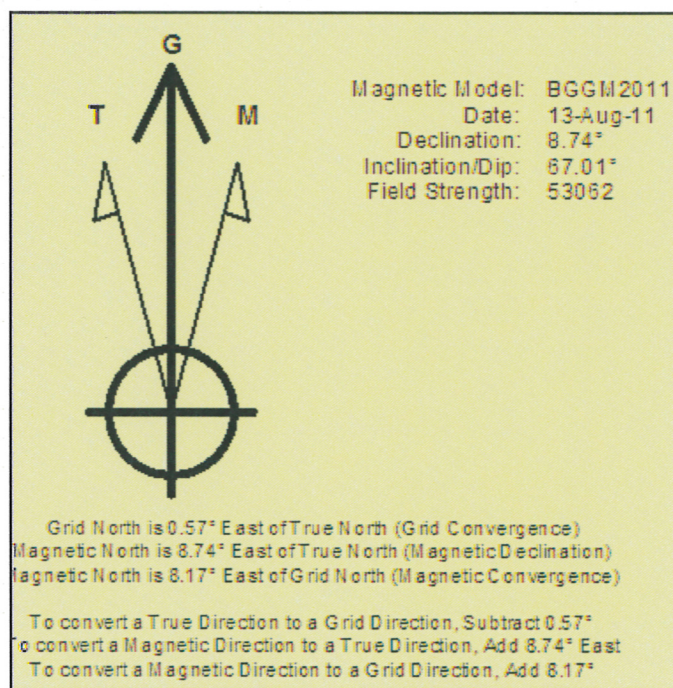
Grid Coordinates of Well: 1,366,071.34 ft N, 3,244,782.28 ft E

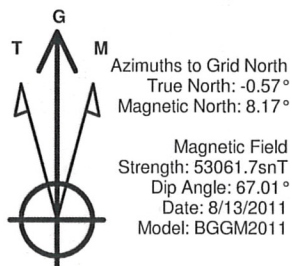
Geographical Coordinates of Well: 40° 20' 05.78" N, 104° 37' 18.95" W

Grid Convergence at Surface is: 0.57°

Based upon Minimum Curvature type calculations, at a Measured Depth of 12,060.00ft
the Bottom Hole Displacement is 5,683.14ft in the Direction of 93.54° (Grid).

Magnetic Convergence at surface is: -8.17° (13 August 2011, , BGGM2011)

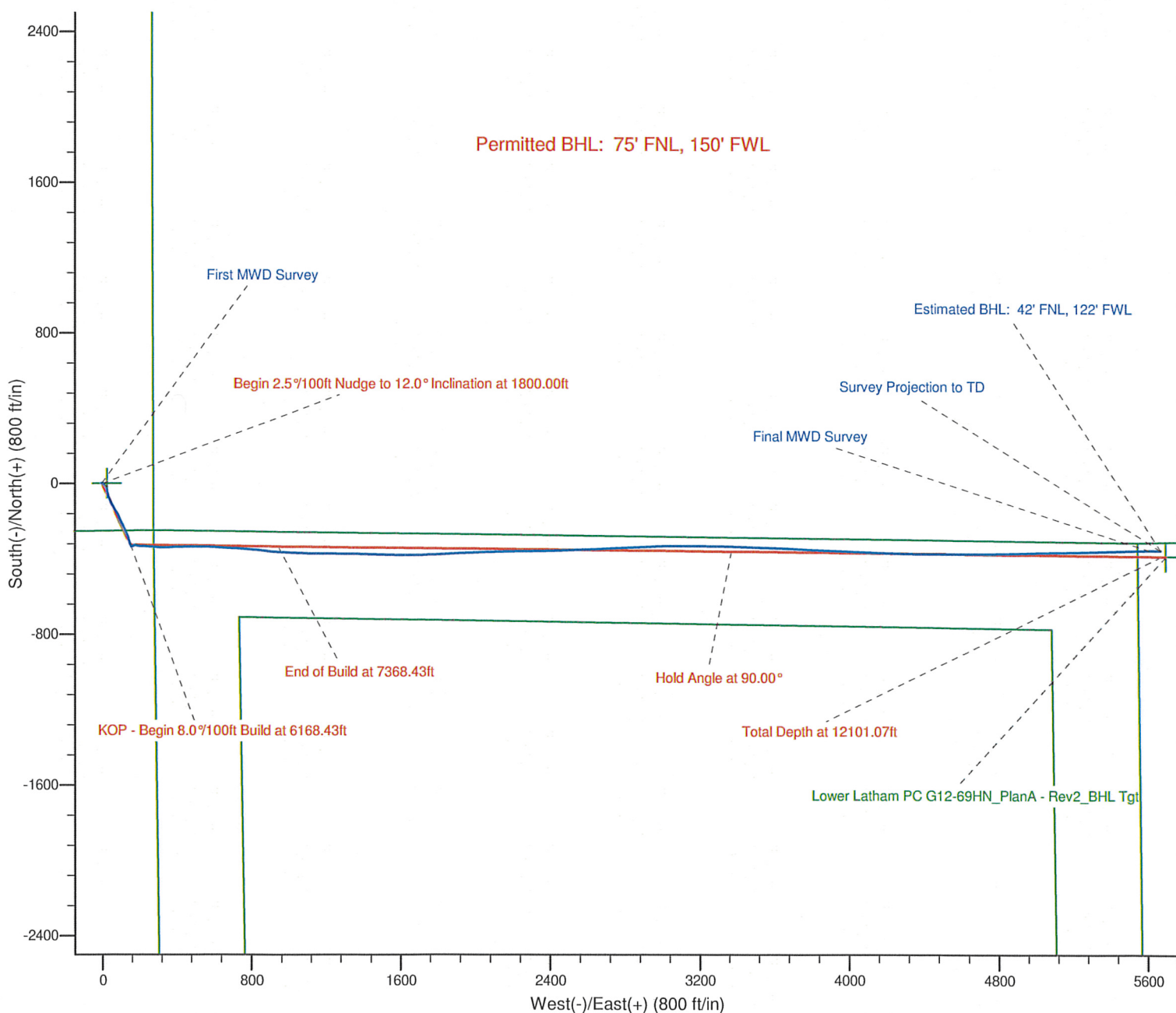




LEGEND

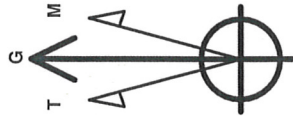
- Lower Latham PC G12-69HN, Plan A, Plan A - Rev 2 Proposal \
- MWD Survey

Halliburton Energy Services, Inc. ("Halliburton") recently completed directional drilling and MWD operations at the Lower Latham PC G12-69HN well located at Weld County, CO. At the conclusion of the job Halliburton performed a final survey on the well. Noble Energy has requested that Halliburton provide them the distances from BHL to section lines from that final survey to allow Noble Energy to meet its requirements under Colorado law. These distances are generated by a mathematical algorithm based on rough data collected after the well is drilled. Halliburton considers it to be a rough estimate only and it is not to be relied upon in any application where accurate data is required. In consideration for Halliburton releasing this data to Noble Energy, Noble Energy agrees to release Halliburton from any consequences of it or anyone else relying on such data.



Project: Weld County, CO (NAD 83)
Site: Sec. 2-T4N-R65W (Lower Latham 2 PAD)
Well: Lower Latham PC G12-69HN

Noble Energy



Azimuths to Grid North
True North: -0.57°
Magnetic North: 8.17°

Magnetic Field
Strength: 53061.7snT
Dip Angle: 67.01°
Date: 8/13/2011
Model: BGGM2011

LEGEND

- Lower Latham PC G12-69HN, Plan A, Plan A - Rev 2 Proposal V0
- MWD Survey

Halliburton Energy Services, Inc. ("Halliburton") recently completed directional drilling and MWD operations at the Lower Latham PC G12-69HN well located at Weld County, CO. At the conclusion of the job Halliburton performed a final survey on the well. Noble Energy has requested that Halliburton provide them the distances from BHL to section lines from that final survey to allow Noble Energy to meet its requirements under Colorado law. These distances are generated by a mathematical algorithm based on rough data collected after the well is drilled. Halliburton considers it to be a rough estimate only and it is not to be relied upon in any application where accurate data is required. In consideration for Halliburton releasing this data to Noble Energy, Noble Energy agrees to release Halliburton from any consequences of it or anyone else relying on such data.

